STATE COLLEGE OF WASHINGTON
AGRICULTURAL EXPERIMENT STATION
Pullman, Washington

Cranberry Investigations Laboratory

Observations and Experiments with Blueberries in Western Washington

by

D. J. Crowley

Bulletin No. 276

January, 1933

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Observations and Experiments with Blueberries in Western Washington

by
D. J. Crowley

The cultivation of blueberries is one of the youngest horticultural industries of western Washington. Nevertheless, the industry is attracting much attention and its rapid development in the near future very probably will be in the sections where the right combination of soil and moisture conditions are found.

The Cultivated Blueberry

Only two species of blueberries have been placed in cultivation commercially, namely, *Vaccinium corymbosum* and *Vaccinium virgatum*. The latter is a native of the southern states and is cultivated chiefly in Florida. Through the courtesy of Dr. G. M. Darrow of the United States Department of Agriculture a few plants of this species were obtained in 1931 for testing in the blueberry experimental plot of the Cranberry Laboratory at Long Beach, Washington. These plants appear to be hardy under Washington conditions but whether they will prove to be of economic importance in Washington remains to be determined.

When cultivated blueberries are mentioned, however, it is generally assumed that the species being discussed is the eastern, cultivated blueberry known scientifically as *Vaccinium corymbosum*. The history of this species as a cultivated plant dates back to 1909 when Coville (3) started his experiments and outlined fundamentals for blueberry culture. Much of his work was done at Whitesbog, New Jersey, where Elizabeth C. White had assembled a large number of blueberry plants that produced berries of unusual size. This collection formed the foundation stock for most of the present commercial varieties.

Important Species Native to Washington

Several species of wild blueberries are native to western Washington. They are commonly, though incorrectly, called huckleberries. No true huckleberries are listed in the flora of Washington. The true huckleberry (*Gaylussacia baccata* C. Koch) has 10 rather large seeds, which detract from the eating quality of the berry. The blueberry, on the other hand, has many tiny seeds so soft that they are scarcely noticed when the berries are eaten.

The fruits of certain of the blueberry varieties native to Washington are gathered each fall and sold to the fresh market and to the canneries The blueberry varieties native to Washington which produce most of the commercial pack are as follows:

Vaccinium ovatum Pursh
Vaccinium macrophyllum (Hook) Piper
Vaccinium ovalifolium Smith
Vaccinium deliciosum Piper

The berries from these species are all marketed as huckleberries, and, owing to the general use of the word huckleberry to designate the native or wild blueberry, they will probably retain that name. The name blueberry will therefore serve to designate the cultivated varieties only.

The first planting of cultivated blueberries in western Washington was made in 1917 by Henry C. Gane, with plants secured from Dr. Coville. While the plants in this plot were not named varieties, they attracted much attention because of their high productivity and freedom from pests.

Blueberry Varieties

Most of the named varieties of blueberries now grown commercially are either selections from the wild plants assembled at Whitesbog, New Jersey, or hybrids made from selected plants by Coville. The principal named varieties are Adams, Cabot, Dunfee, Greenfield, Grover, Harding, Jersey, June, Katharine, Pioneer, Rancoccas, Rubel, Sam, Stanley, and Scammell.

All these varieties are now growing in the blueberry experimental plots at Long Beach, Washington and most of them have been under observation for several years. As previously stated, (4), all these varieties are prolific but certain of them have proved to be better adapted to local climatic conditions than others. In selecting varieties best adapted to conditions in a large part of western Washington, it was necessary to eliminate those that do not ripen their fruits in an average season before August 15. Varieties that do not ripen before the middle of August encounter a certain amount of competition from the wild blueberries which come to the market about that time.

For those areas of western Washington, such as Pacific and Grays Harbor counties, and elsewhere where the summers are comparatively cool, the varieties best adapted to the growing season are Cabot, Harding, Katharine, Pioneer, Sam, Rancoccas, Rubel, and Scammell. Crop production records for the last three years indicate that the average yield of each of these varieties is nearly the same

The June variety later probably will be included with the recommended list as it is one of the earliest of the high bush varieties. It has not, however, been sufficiently tested under local conditions to

justify its inclusion at present. The Greenfield variety is the earliest of all the named varieties. Under local conditions, however, it is an uncertain producer. Its chief defect is its habit of blossoming in September or October, after the fall rains start.

The Grover variety is vigorous, produces a bush from seven to eight feet tall and bears a good crop, but in the strictly coastal areas its berries rarely ripen before the twentieth of August. Farther inland from the ocean where the summer temperatures are higher, it is quite possible that this and some of the other varieties not included in our list may prove desirable.

Variety Descriptions

The Cabot variety is a rather low growing bush of moderate vigor, averaging about three feet in height. The large size and the excellent flavor of the berries produced by this variety make them almost the unanimous choice of those who prefer to eat the fruit uncooked.

The Harding variety grows slightly taller than the Cabot. Its berries ripen in the coastal areas about 10 days later than those of the Cabot. The fruits of the Harding bush are large, tender skinned, and have a good flavor.

Figure 1. **The bush of the Katharine blueberry. Note its upright habit of growth (See Fig. 2) and its compact fruit clusters.**

The fruits of the Katharine variety, which are large and of excellent flavor, ripen about the same time as those of the Harding. Because the fruits grow in compact clusters and tend to adhere to their point of attachment, they are somewhat more difficult to pick than those of Harding or Cabot. Nevertheless, the Katharine is second choice to the Cabot for those who prefer the berries uncooked. The bush has an upright habit of growth (Fig. 1) and is somewhat taller and more vigorous than the Harding or Cabot.

The Pioneer is one of the heaviest producers, although the bush is only medium in height. The berries ripen about the same time as do those of the Harding and Katharine, but they are not quite as large

The Rubel variety ripens about a week later than does the Pioneer. The bush grows from four to five feet tall, and is one of the most prolific of all the varieties mentioned. Its berries, however, are not quite as large as those of the varieties previously mentioned.

The Sam variety grows to about the same height as the Rubel, but it has a less upright habit of growth. Therefore, unless carefully pruned, its branches have a tendency to bend to the ground when loaded with fruit. (Fig. 2.) The berry produced is larger than that of the Rubel.

Figure 2 The bush of the Sam variety of blueberry. Note the tendency of the branches to bend when loaded with fruit. (See Fig. 1.)

Rancoccas and Scammell ripen in late July or early August. Both varieties produce good crops of exceptionally large well-flavored berries. While these two varieties look very promising, they have just come into bearing in the experimental plot.

Hybrids. No crosses have as yet been made between the cultivated blueberry *V. corymbosum* and any of the native Washington blueberry varieties. Some of the native high bush species ripen very evenly and can be gathered at one picking, while most of the cultivated varieties ripen more or less unevenly and are gathered in about four or five pickings. This latter characteristic of the cultivated blueberry is ideal for the fresh market or for home use, but when the Washington blueberry industry reaches the point where the berries are produced for the canning trade a variety whose fruits mature so that they may be gathered in one or two pickings will be very desirable. The size of the native blueberries and their time of ripening is less adversely affected by a cool growing season than is the case with the cultivated varieties. It appears that hybrids of the native and the cultivated blueberry may eventually have an important place in the Washington blueberry industry.

Soil Requirements

The blueberry is a close relative of the cranberry, and like the latter it requires acid soil conditions. It grows best on shallow peat soil or on a soil composed of a mixture of peat and sand. Where such a combination occurs naturally, both soil and moisture conditions are as a rule ideal for blueberry growing.

The blueberry plant, however, is by no means limited to such soils. It has been observed growing well on soils where the peat is eight to 10 feet deep with no sand present, on sandy and gravelly soils with little evidence of peat, and on a Melbourne clay with only a small amount of humus present. The plants observed on the Melbourne clay hillside are four years old and have a normal set of fruit buds for next year. (Fig. 3.) They have made slightly less growth, however, than plants of the same age where soil and moisture conditions are more favorable. On sandy or gravelly soil it is important that sufficient moisture and plant food be available. Therefore, in such locations, in order to maintain the requisite amount of moisture, irrigation would probably be necessary during the summer months.

Where a few plants are desired for the home garden, the soil requirements can be produced artificially by digging a hole about one foot deep and two feet in diameter for each plant, and filling it with peat or a sand and peat mixture. The plants set out in a location of this kind should be watered frequently throughout the growing season the first year. Since the blueberry requires an acid soil, no lime or wood ashes should be scattered near the plants.

Figure 3. The Grover variety of blueberry growing on a Melbourne clay soil.

While the blueberry requires abundant moisture during the growing season, it also requires good drainage. The plants will not thrive in locations that remain overflowed during periods of high water and, if water is left on the surface for more than 24 hours during the grow-

ing season, the plants are either seriously injured or killed. Throughout the growing season, the water table should be low enough so that it does not interfere with the aeration of the root system. As the blueberry is not a deep-rooted plant, sufficient drainage is maintained in peat soils when the water table is kept to a depth of from two to three feet below the surface of the ground; on sandy or gravelly soils a depth of 18 inches is ample.

Preparing Ground for Planting

In clearing land preparatory to the planting of blueberries, the usual practice is to remove the stumps and roots with a stump puller. They are then piled up and burned. Inasmuch as soil lacking peat or other humus is not well adapted to blueberry growing, special care should be taken to avoid burning off such material. As wood ashes are toxic to blueberry plants, even in small quantities, all ashes should be removed from the land as soon as the stumps have been burned.

The soil should then be plowed to a depth of at least eight inches. Where submerged roots make deep plowing impossible, hand spading should be resorted to in order to stir the soil thoroughly where the individual plants are to be placed. Cranberry bogs too dry for successful cranberry culture may be prepared for blueberry growing with little cost. If the vines are burned off during July or August, nearly all of the cranberry roots will be killed and the ground may then be worked in preparation for replanting to blueberries the following winter or spring.

Planting

Inasmuch as the soil rarely freezes in western Washington, blueberry plants may be set out almost any time from November until the middle of April. Best results are obtained, however, when the plants are set out before the middle of March, as they then become established in the soil before dry weather sets in. In New Jersey the plants are set out in rows eight feet apart with the plants four feet apart in the rows. Under Pacific Coast conditions, however, where weeds are more of a problem it is easier to control the weeds when the plants are spaced far enough apart so that a horse cultivator can be run between the rows both ways. On this account, it is recommended that the plants be set eight feet apart each way in commercial plantings.

In setting out the small blueberry plants it is essential to have well pulverized soil. It is a good practice to dig a hole one foot in diameter and about eight inches deep. After setting in the new plant, the hole should be refilled with peat or humus and the soil then compacted by a thorough watering. On account of the fact that no new

roots are formed during the first several months, occasional waterings may be necessary during this period.

Cross Pollination

While a blueberry bush will set fruit when pollen of other varieties is excluded, larger berries and higher yields are obtained when cross pollination is provided. Experience indicates that the recommended varieties are inter-fertile, and they bloom at about the same time. Bumble bees are very active in a blueberry planting during blossoming time (Fig. 4.) and if the rows of different varieties are alternated there will be little difficulty in securing a good set of fruit. Tame bees work among the blueberry flowers to some extent, but pollination is accomplished almost exclusively by native bumble bees.

Figure 4. A bush of the Rubel variety in full bloom (May 1) showing the desirable method of training with the several branches starting from the ground.

Bearing Age and Yields

Plants set out in a favorable location should produce several new shoots from 10 to 20 inches long by the end of the first growing

season. As a rule some fruit buds are also set, but it is a good practice to remove the fruit buds for the first two seasons. About one quart of berries per bush may be expected the third year and the crop increases each year thereafter for several years. A mature bush produces from three to five quarts of berries.

Cultivation

Inasmuch as the root system of the blueberry is comparatively close to the surface, particular attention should be given to moisture conditions until the plants are thoroughly established. In moist soils a large part of the root system of the blueberry plants is very near the surface and deep hoeing should not be practiced close to the plants. In fact, under such conditions mounding the soil around the plants is a good practice. The soil between the rows should be frequently cultivated if best results are to be obtained. This conserves the moisture by controlling the weeds and loosens the soil so that optimum conditions for root growth are obtained.

Pruning

Pruning is a very important cultural practice in blueberry growing. Unpruned blueberry bushes soon show a decline in yields as well as in the size of the fruit. A knowledge of the fruiting habit of the plant is necessary, however, before pruning can be carried on intelligently. The blueberry bears fruit on mature wood of last season's growth. The largest berries are borne on the wood that has made the most vigorous growth the previous year. All pruning should be done in the dormant season before growth starts.

The pruning program for a blueberry bush during the first two seasons consists of removing the bushy growth at the base of the plant and any fruit buds from the new straight shoots that are left. An effort should be made, however, during the first two years to prune the bush so that it has several branches starting from the ground rather than being of the tree type with a single main trunk. (Fig. 4.) If this is done, pruning or cutting back of the individual branches that come from the ground later can be done with less sacrifice of the crop than where the bush is shaped like a tree.

In New Jersey, where commercial blueberry growing is well established, Beckwith and Coville (2) recommend the annual cutting back of about one-third of the total number of the branches of the bush to within about three inches of the ground. When that method is practiced the bush will at no time contain wood more than three years old. Data obtained at the Cranberry Experiment Station indicate that this practice gives good results under Washington conditions.

Hence, after the third year the bushy growth at the bottom of the plant is removed and from one-fourth to one-third of the old branches

or stems are cut back to three- or four-inch stubs. This practice is followed each year thereafter, the oldest looking wood being cut back so that an abundant supply of new vigorous wood growth is always available.

Inasmuch as the different sections of a blueberry bush are cut back to a stub in the regular course of pruning, there is no permanent shaping of the framework of each bush such as is desired with apple trees. Each blueberry variety, however, has certain typical growth habits, and most of these that are found undesirable can be modified somewhat each time a section of the bush is cut back. If too many sprouts come from one stub the more upright ones can be left while the others can be pinched off. Many of the blueberry varieties set more fruit buds than the bush can take care of. When this occurs the bush produces a large number of undersized berries and a small amount of new wood growth. The varieties, Pioneer, Sam, Harding, and Katharine, have this tendency, and therefore a considerable tipping back of the fruiting wood is necessary when they are being pruned. Referring to Figure 5, it is evident that because of the distribution of fruit buds throughout the length of the 20 inches of new growth, the first two or three varieties (Sam, Pioneer, and Katharine) require rather severe cutting back of fruiting wood. The fourth variety from the left (Harding) requires less severe cutting back, and the two on the right (Grover and Adams) require no cutting back since the fruit buds are confined only to the terminal portion of the season's growth. Four or five fruit buds on each fruiting twig are ample. There is no difficulty in identifying the fruit buds as they are large and plump while the vegetative buds are small and slender.

Fertilizers

Good crops of blueberries have been produced and are still being produced yearly in many of the local blueberry plantings without the addition of commercial fertilizers. Experiments were started in 1928 at the Cranberry Experiment Station, to determine: first, whether the size of the berries could be increased, and second, whether the growth of the young plants could be speeded up by the use of commercial fertilizers. The New Jersey fertilizer formula (2) for blueberries, namely, 125 pounds of nitrate of soda, 200 pounds of tankage, 400 pounds of rock phosphate, and 75 pounds of sulfate of potash, was first used. As a result, however, of the fertilizer experiments of the Cranberry Experiment Station, the fertilizer formula now recommended for the peat soils, where most of the Washington blueberries are grown, is as follows: 100 pounds nitrate of soda, 200 pounds rock phosphate, and 50 pounds sulfate of potash. The yield from the plots receiving this fertilizer treatment was approximately twice that of the untreated plots the first season and more than two and one-half

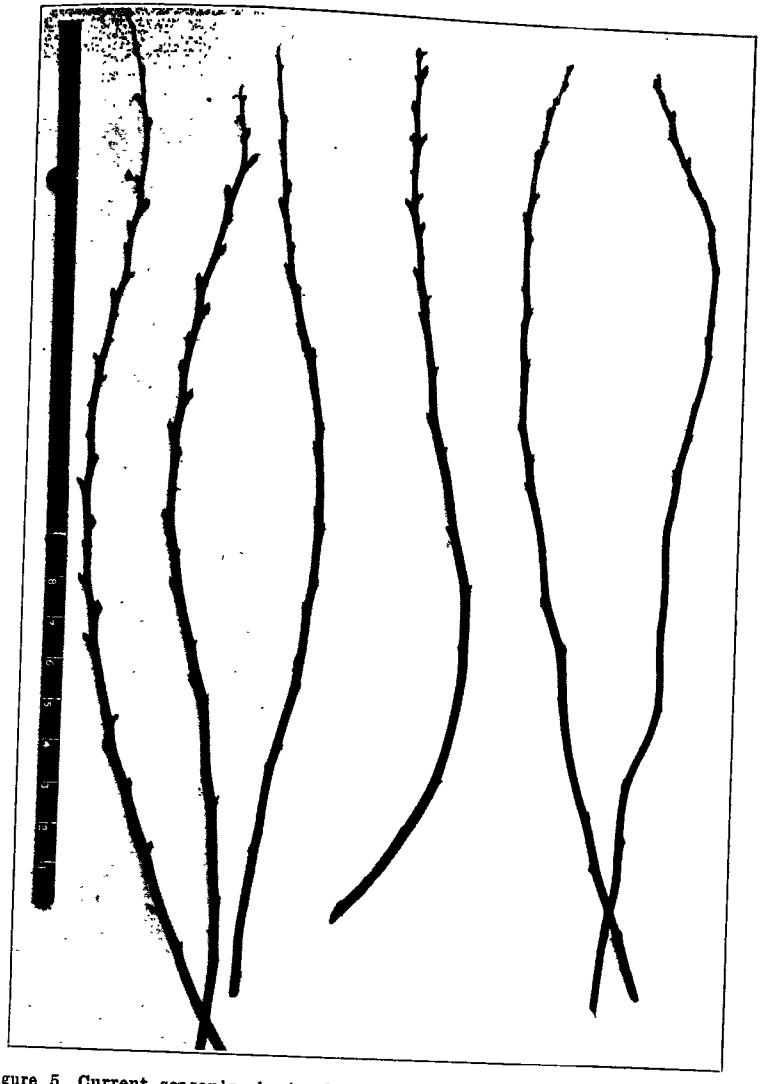

Figure 5. Current season's shoots showing the comparative number and position of fruit buds (large plump buds) characteristic of several varieties. Reading from left to right the shoots are from varieties as follows: Sam, Pioneer, Katharine, Harding, Grover, and Adams.

times as much in 1932. The increase was due to the larger size of the berries and to the large amount of new wood on the fertilized bushes. The fertilizers were applied in February, and the ensuing rains and cultivation worked the materials into the soil. Applications of commercial fertilizer to blueberry plants under three years old in order to force growth gave negative results.

Insects and Diseases

The cultivated blueberry in Washington is remarkably free from serious insect pests. Insect injury has at no time been serious enough to warrant the use of control measures. The Tussock moth, *Notolophus antiqua* Linn., the tent caterpillar, *Malacosoma disstria,* Hbn., and several species of cutworms occasionally are found chewing on the foliage. None of them, however, appear to be more partial to the blueberry than to the adjacent wild shrubbery.

The blueberry plants are also rarely attacked by fungi. Only one bush has so far shown sufficient injury from fungi to affect its yield. This bush lost most of its crop both in 1931 and 1932. The first symptoms of the disease are a blighting of the blossoms and of the new shoots. These soon shrivel and die. Many of the berries that survive are filled with a white cottony hyphae similar to that found on cranberries affected with the cotton-ball disease. The fungus causing this disease has been identified as a Sclerotinia species, and from its general appearance under the microscope and in culture media it is probably the same organism as that which causes the cotton-ball disease of the cultivated cranberry.

Propagation

The blueberry industry would have developed much more rapidly in Washington had it not been handicapped by the comparatively high price of rooted plants. This high price resulted from the fact that blueberry cuttings have been rooted with difficulty. Until Johnston (5) published his results with soft wood cuttings most of the new plants were propagated from hard wood. Inasmuch as there is always a considerable amount of hard wood available as a result of pruning, the average grower is interested in some of the methods of propagating hardwood cuttings.

Hardwood Cuttings. The hardwood to be used for propagating is selected in January or February when the pruning is being done, care being taken to use only healthy wood. Wood two years old or older is cut into pieces about six inches in length and buried in moist sand if the propagating bed is not ready. The propagating bed or ordinary cold frame is filled with a mixture of peat and sand or chopped sphagnum moss and sand to a depth of about eight inches

This mixture should be in the proportion of two parts peat to one of sand by volume. This soil mixture is thoroughly watered. The cuttings are then laid in a horizontal position, pressed firmly on this soil, and covered to a depth of about one inch with finely chopped sphagnum moss or with about one inch of the sand and peat mixture. The bed should be watered so as to keep the soil moist at all times.

The new shoots from these cuttings come through the soil in May or June. As soon as the new growth appears the propagating bed or frame should be protected from direct sunlight by providing shade. It is not advisable to keep the propagating frame tightly covered as the new shoots thus tend to become tender and subject to attack by fungi. These new shoots put out roots about the end of August and can be moved to the nursery during the winter or spring. Normally the old wood decays after the new shoots become rooted. Occasionally, however, roots form on the old wood as well.

Another method of propagating hardwood cuttings that has been used successfully by Beckwith and Coville (2) in New Jersey is as follows: The cutting bed is of the ordinary cold frame type covered with glass. This cutting bed is filled with a mixture of well rotted

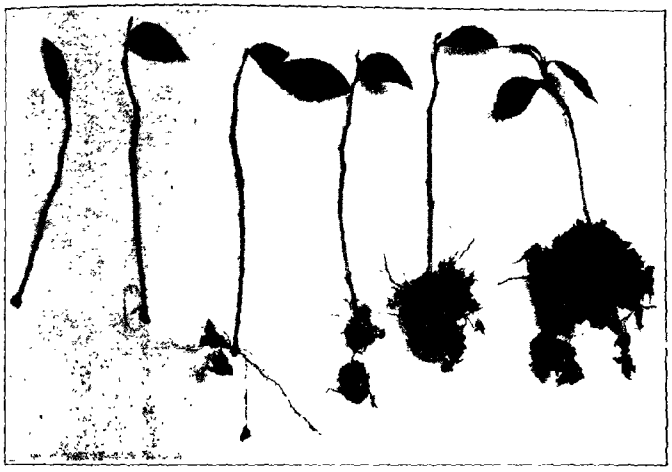

Figure 6. Difference in the rooting of the heel type of blueberry cuttings in a sphagnum moss-sand. The plant on the left shows callus formation on July 15; the second from the left shows the first roots forming, August 25; the third and fourth from the left show the root development about September 25; the two on the right show plants ready for removal to the nursery row about November 1.

peat and sand, half and half by volume. The mixture is placed loosely in the bed and packed by watering. The cuttings are set out one inch apart in rows about two inches apart. These cuttings are made from mature wood of the previous season's growth. They are cut from three to four inches long with several leaf buds on each cutting. No cuttings with fruit buds should be used. After the cuttings are planted they are sufficiently watered to set in place and then tightly covered with glass. The first waterings should be frequent enough to keep the air inside the frame saturated. After a few weeks, however, the cuttings are watered only when necessary to keep the bed moist. Cuttings should not be watered in the middle of the day. The propagating frame should always be shaded during the middle of the day except in cloudy weather. In clear weather the shades may be put on about nine in the morning and left on until four o'clock in the afternoon. Cuttings may be left uncovered during cloudy days but should be covered immediately when the sun comes out. The shades are made of plastering lath set about three-eighths of an inch apart on a frame the same size as the sash. The glass is kept tightly affixed on the beds until about the last of June when some ventilation is permitted. The ventilation is gradually increased until about the end of August when the plants are exposed to atmospheric conditions.

The cuttings send out new shoots soon after they are planted in the bed. By the end of June this growth stops and root growth starts. If the cuttings root, additional new growth will be made in July and August. These cuttings are set in nursery rows for a year before being planted in the field.

Soft Wood Cuttings. Johnston (5) reports good results in rooting soft wood cuttings in solar and box frames in Michigan, and poor results when the cold frame was used.

The first attempt at rooting soft wood cuttings at the Cranberry Experiment Station was made in 1931. A dozen straight cuttings and a dozen heel type cuttings were placed in a cold frame on June 5. All were taken at the same time from a Rubel bush. The propagating frame was uncovered with the exception of cheese cloth to provide some shade. All the heel type cuttings calloused and seven rooted. None of the straight cuttings produced roots.

In 1932 several hundred soft wood cuttings were set out at various times during the growing season. Consistently high percentages of rooted cuttings were obtained from the heel type of soft wood cuttings set out on May 26, June 15, and July 10. Table 1 gives the percentages of rooted cuttings obtained in 1932 with the different dates of planting, type of cutting, and kind of soil.

Table 1. Percentages of Rooted Blueberry Cuttings Obtained Under Various Conditions

Date	Number of cuttings	Type of cutting	Soil used	Per cent rooted
May 26	100	heel	Peat and sand	40
May 26	100	straight	Peat and sand	10
May 26	100	heel	Sand	60
May 26	100	straight	Sand	15
June 15	200	heel	Sphagnum moss and sand	95
June 15	200	straight	Sphagnum moss and sand	20
June 15	200	heel	Sand	80
June 15	200	straight	Sand	28
June 15	100	heel	American peat	5
June 15	100	straight	American peat	0
June 15	100	heel	Chopped Sphagnum and sand	68
June 15	100	straight	Chopped Sphagnum and sand	20
July 10	100	heel	Chopped Sphagnum and sand	90
July 10	100	straight	Chopped Sphagnum and sand	26
July 10	100	heel	American peat	10
July 10	100	heel	Sand	72

Table 1 indicates that a high percentage of rooted cuttings of the heel type can be obtained under Washington conditions if the cuttings are made and planted any time from May until the middle of July. The highest percentage of rooted cuttings was obtained in this experiment when the material was set out from June 15 to July 10. While not shown in Table 1, attempts were made to root soft wood cuttings during late July and August. The percentage of rooted cuttings, however, made after the middle of July declined rapidly. American peat proved to be a poor medium in which to root cuttings. This may be partly due to its high water-absorptive power and consequent tendency to exclude air from the live plant tissue. Sand in contact with the cutting gave best results, though a sand propagating bed is not recommended because of its tendency to lose moisture.

In propagating by means of the heel type of soft wood, the cutting bed can be made similar to that used for hardwood cuttings. It should be in a well drained position and thoroughly protected from direct sunlight at all times until the cuttings are rooted. If the cutting bed is located in a grove or other position well protected from drying air currents it is not necessary to cover it with glass. Cuttings under cheese cloth or lath covering gave as high a percentage of rooted cuttings as those under glass.

Figure 7. The plant on the left shows the soft wood cutting after one year in the nursery and the plant on the right after two years in the nursery.

The cutting bed is loosely filled with chopped sphagnum moss to a depth of about six inches. Trenches about one inch in width, two or three inches in depth, and about four inches apart are made in the moss by means of a trowel. Sand is placed at the bottom of the trench on which the cuttings rest. The cuttings are then planted in the trench about two inches apart and the remainder of the trench is filled with the sand. The bed is sufficiently watered to set the cuttings in place. Successive waterings should be made only when necessary to keep the bed moist, the water being applied to the moss instead of to the cuttings.

One hundred per cent of the heel type cuttings calloused in sand alone, but a sand type of propagating bed requires close attention during dry weather because of its tendency to dry out The propagating bed should be protected with a shelter roof as heavy rains or excessive watering will kill the cuttings Soft wood cuttings may be taken as soon as the new growth is woody. Succulent cuttings failed to root in all tests The cuttings can be either cut off the bush or preferably pinched off by hand, a heel being left attached. If loose bark is attached to the cutting, it should be trimmed off; otherwise the cutting may be placed in the bed just as it has been pinched off the bush If the cuttings are more than four inches long, it is advisable that they be cut back so that they are of uniform length for ease in handling. When they are removed from the bush they should be placed in a wet cloth or in a pail of water while being prepared for the propagating bed.

The cuttings start to callous in four to six weeks and roots start to form about the end of August Most of the cuttings are well rooted by the end of October. (Fig. 6) They can then be moved from the propagating bed to a nursery row, care being taken to prevent breaking the roots No special care is given them in the nursery row except to see that the moisture requirement is satisfactory. (Fig. 7.) The rooted plants can be transplanted to their permanent location in the field after one year in the nursery.

Seedlings

While cultivated blueberry seedlings are sold as such in western Washington the purchaser should understand that he is buying something that may be of little value Blueberries do not come true to type from seed and most seedlings are worthless. From 25,000 seedling hybrids Coville (1) found less than a half dozen suitable for distribution. In western Washington, where there is an abundance of moisture and mild winters, seedlings in quantities grow under the bushes each year if the berries are not picked clean. None of these seedling plants should be placed on the market until they have proved themselves to be up to the standards set by the named varieties.

If, however, seedlings are desired, blueberry seeds grow readily in any of the various mixtures used for propagating blueberry cuttings. The seeds should be taken from the berry and placed on the soil, being either pressed against it or lightly covered. Most of the seeds germinate in a few weeks if the soil is kept moist. They require little protection under Washington conditions.

Harvesting and Marketing

Blueberries grow in clusters of about 10 or 12 berries in each cluster. The large berries at the top of the cluster ripen first while

those at the bottom of the cluster may not ripen until four or five weeks later. The berries therefore have to be picked by hand, care being taken to pick only ripe berries. Ripe blueberries have the blue color right up to the stem. If the berries are allowed to become overripe, however, they crack if a rain occurs, before they are picked. This makes the picking of the sound berries more difficult. The berries should be picked at least once a week during the peak of the ripening period. Picking starts about July 1 and ends about August 20. The cost of picking is about 10 cents per quart.

The berries are sold by the quart and as the production in Washington is limited each grower uses his individual idea of a shipping crate. Blueberries usually are marketed as soon as they are gathered. Experiments indicate, however, that they may be held several days with little shrinkage, and that they stand up well when shipped as far away as Los Angeles, a distance of about 1200 miles.

Cultivated blueberries grown in Washington have sold readily at good prices, and though increased production may force the price down there will undoubtedly be a profitable demand for this delicious berry.

Acknowledgment

The author wishes to express his appreciation for the helpful suggestions and criticisms given by Dr. E. L. Overholser in the preparation and editing of this publication.

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